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U. S. DEPARTMENT OF AGRICULTURE.

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FARMERS' BULLETIN No. 194.

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# ALFALFA SEED.

BY

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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
OFFICE OF THE CHIEF,  
*Washington, D. C., March 15, 1904.*

SIR: I have the honor to transmit herewith a paper on Alfalfa Seed, and respectfully recommend that it be published as a Farmers' Bulletin. This paper was prepared by Mr. Edgar Brown, Botanist in Charge of the Seed Laboratory, and was submitted by the Botanist with a view to publication.

Respectfully,

B. T. GALLOWAY,  
*Chief of Bureau.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*



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# ALFALFA SEED.

## INTRODUCTION.

The quality of alfalfa seed offered on the market this season is unusually low and consequently special care should be used in buying. It is important that the farmer's attention should be called to this, as the use of a low-grade or adulterated seed means the partial or complete loss of the crop.

## INCREASED USE OF ALFALFA.

The acreage of alfalfa in this country is increasing rapidly in the well-known area in the irrigable portions of the arid region from the Missouri River westward, as well as in the eastern humid part of the United States, where its cultivation has been more recently introduced. The larger area sown each year, together with a short seed crop for the last two years, has created a demand for seed far in excess of the domestic production. The usual results have followed this scarcity. The price of good seed has advanced, larger importations of foreign seed are being made, a considerable amount of adulterated seed is being offered, and the average quality of commercial seed is low.

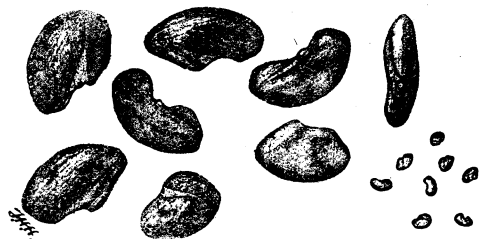


FIG. 1.—Alfalfa seed (*Medicago sativa*.)

## IMPORTATIONS.

During the eighteen months from June 30, 1902, to December 31, 1903, 1,999,335 pounds of alfalfa seed were imported. The table on page 9 shows the results of analyses of the seed imported during the six months ended December 31, 1903.

## DESCRIPTION OF SEED.

Alfalfa seed is about the size of the seed of red clover, but is easily distinguished from it by its uniform light olive-green color, as contrasted with the purple and yellow of clover seed. Unlike red clover, it varies considerably in shape. The various forms are shown in figure 1.



## ADULTERATION.

Alfalfa seed is not often adulterated, but numerous samples have recently been received at the Seed Laboratory for examination which contain a considerable percentage of yellow trefoil seed. A few samples have also been received which contain bur clover.

### YELLOW TREFOIL.

The seed which is most used in this country as an adulterant of alfalfa seed is yellow trefoil. It is darker green than alfalfa, so that a sample containing from 10 to 40 per cent of it looks brighter and better at the first glance than slightly discolored alfalfa seed. Yellow trefoil seed, however, can be easily distinguished by an expert, on examination, through a hand lens, by the differences in shape. Figure 2 shows the typical form of yellow trefoil seed.

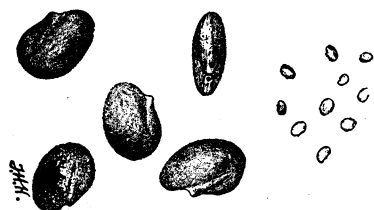


FIG. 2.—Yellow trefoil seed (*Medicago lupulina*).

Yellow trefoil is a low-spreading, leguminous plant grown for sheep pasture on some of the poor, light soils of Europe where other forage crops do not grow. It is not grown

to any extent in the United States and is of no value where clover or alfalfa is successful.

### IMPORTATION OF YELLOW TREFOIL SEED.

On account of the low price of yellow trefoil seed and its resemblance to alfalfa and red clover it is imported into this country in considerable quantities and used as an adulterant of both these seeds. During the six months from June 30 to December 31, 1903, 110,760 pounds of yellow trefoil were imported and practically all was used to adulterate alfalfa and red clover seed.

### ANALYSES OF ADULTERATED SEED.

The following table shows the relative amounts of alfalfa seed that will grow and of yellow trefoil seed in the adulterated samples recently examined in the Seed Laboratory of the Department of Agriculture:

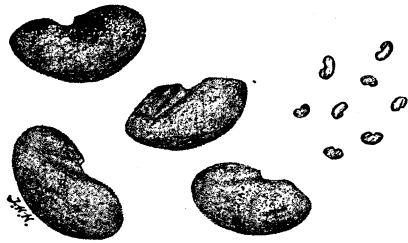
*Relative amounts of alfalfa seed and trefoil seed in adulterated samples recently examined.*

Laboratory test No.	Sender's mark.	Alfalfa that will grow.	Yellow trefoil.
		<i>Per cent.</i>	<i>Per cent.</i>
19878	.....	63.11	31.12
19880	"Glen".....	61.06	33.44
19881	"Glen".....	59.62	34.44
23257	"Pan".....	56.4	16.5
23258	"Jake".....	71.72	13.36
23259	"Glen".....	61.4	37.9
22440	"E".....	57.76	40.38

## CHILEAN LUCERN.

Under the name of Chilean lucern, or luzerne, bur clover is used as an adulterant of alfalfa seed in Germany and has recently been found in seed offered for sale in the United States. It is obtained from the woolen factories in Germany which use Chilean wool. Bur clover grows abundantly in Chile, and the burs catch in the wool as the sheep are pasturing. In the process of combing the wool the burs are removed, and the seed is afterwards cleaned and put on the market to be used as an adulterant of alfalfa seed.

This seed is similar to that of alfalfa in shape, and though slightly larger and lighter in color, it lends itself most readily to use as an adulterant. There are two species occurring in about equal quantities,

FIG. 3.—Bur clover seed (*Medicago maculata*).FIG. 4.—Bur clover seed (*Medicago denticulata*).

which are apparently the ones common on the Pacific coast of the United States (*Medicago maculata* and *M. denticulata*). The seed is shown in figures 3 and 4.

## ANALYSES OF IMPORTED SEED.

The following table shows the results of analyses of alfalfa seed imported during the six months ended December 31, 1903:

*Results of analyses of alfalfa seed imported during six months ended December 31, 1903.*

Laboratory test No.	Alfalfa seed.	Broken seed and dirt.	Weed seeds.	Number of weed seeds in 1 pound.	Number of dodder seeds in 1 pound.	Alfalfa seed that will grow.	Amount imported.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>			<i>Per cent.</i>	<i>Pounds.</i>
21000.....	93.38	5.8	0.82	2,160	.....	63.73	4,000
21001.....	92.1	7.34	.56	900	.....	59.17	30,800
21002.....	82.28	15.92	1.8	3,060	.....	66.64	5,500
21003.....	84.72	11.58	3.7	3,420	.....	57.39	32,877
21004.....	89.16	8.78	2.06	2,700	90	62.18	14,700
21005.....	74.06	21.38	4.56	15,928	2,520	53.87	7,613
21006.....	58.74	34.46	6.8	32,420	5,490	28.78	33,075
21007.....	86.12	11.34	2.54	8,964	270	61.36	8,778
21008.....	73.02	22.32	4.66	12,829	90	49.65	32,965
21009.....	96.82	2.72	.46	990	.....	85.2	33,000
21010.....	86.2	12.1	1.7	3,060	.....	55.59	30,800
21011.....	96.96	2.16	.88	1,710	.....	87.26	5,500
21012.....	88.84	3.98	7.18	17,299	.....	43.2	33,000
21013.....	96.24	2.66	1.1	3,510	.....	77.47	21,340
21014.....	91.06	5.44	3.5	7,650	.....	62.14	8,778
21015.....	93.44	2.7	3.86	8,525	.....	77.08	33,000
21016.....	77.78	16.04	6.18	16,435	360	47.88	33,000

*Results of analyses of alfalfa seed imported during six months ended December 31, 1903—Continued.*

Laboratory test No.	Alfalfa seed.	Broken seed and dirt.	Weed seeds.	Number of weed seeds in 1 pound.	Number of dodder seeds in 1 pound.	Alfalfa seed that will grow.	Amount im-ported.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>			<i>Per cent.</i>	<i>Pounds.</i>
21017.....	81.52	12.18	6.3	21,848	720	7.13	16,280
21018.....	69.48	23.78	6.74	23,082	810	5.21	38,172
21019.....	96.5	3.04	.46	1,080	.....	88.53	44,000
21020.....	96.4	2.82	.78	1,260	.....	91.82	44,000
21021.....	94.4	5.04	.55	1,620	.....	90.15	72,600
21022.....	24.5	71.96	4.54	21,070	4,950	6.34	12,540
21023.....	94.14	1.8	4.06	3,780	.....	73.43	234
21024.....	94.58	3.44	1.98	3,060	.....	51.78	5,500
21031.....	87.72	11.02	1.26	4,140	90	81.14	143,000
21032.....	90.56	8.08	1.36	3,420	.....	76.29	33,000
21033.....	89.04	10.5	.46	1,260	90	84.7	6,673
21035.....	72.36	27.1	.54	270	.....	64.58	13,516

All grades of seed are imported, as is shown by the analyses in the above table. Of the 66,992 pounds contained in lots Nos. 21017, 21018, and 21022, practically no seed would grow if sown. It is more or less shriveled and could not be sold in the retail market on account of its dark-brown color. These worthless lots consist of dead seed and screenings which can be imported at about 2 cents per pound.

### GRADING DOWN.

The way in which this dead seed is mixed with good seed at a profit to the dealer is illustrated as follows:

Cost of 100 pounds of worthless seed.....	\$2.00
Cost of 100 pounds of good seed .....	15.00
Cost of 200 pounds of the mixture .....	17.00
200 pounds of mixture sold at \$12 per hundredweight .....	24.00
Cost of mixture .....	17.00
Illegitimate profit from mixing.....	7.00

From the farmer's standpoint the situation is reversed:

Cost of 200 pounds of the mixture .....	\$24.00
Value of the 100 pounds of good seed in the mixture.....	15.00

Price paid for the 100 pounds of worthless seed in the mixture .....	9.00
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The farmer is further deceived by thinking that because he bought 200 pounds of seed he has nearly 200 pounds of seed that will grow, and he will sow it accordingly. The result will be a thin stand and a poor crop.

### COLOR OF DEAD SEED.

A mixture of dead seed can easily be detected by the color. Fresh seed which will grow is light olive-green and when rubbed in the hands gives a bright, glossy surface. Whenever alfalfa seed is any shade

of brown it will not grow and is worthless. If a sample contains any considerable percentage of discolored seed it should not be accepted.

### WEED SEEDS.

The best grades of alfalfa seed contain comparatively few weed seeds. The low grades, however, which are mostly screenings, often carry large numbers of weed seeds, as is the case with sample No. 21006, the analysis of which is shown on page 9. This sample contained 6.8 per cent of weed seeds, or nearly 32,500 per pound, of which 5,490 were dodder.

#### DODDER.

Dodder is the weed most destructive to the alfalfa plant. It is a parasite having no leaves and appears as a tangled mass of fine yellow stems winding about and clinging to other plants (fig. 5). The seed germinates in the ground and sends up a slender stem that winds around the alfalfa plant to which it attaches itself. The dodder root soon dies, while the stems continue to grow and thrive on the juices of the alfalfa until it has matured seed or the alfalfa has been killed.

Dodder occurs over most of the area where alfalfa is grown, except in the extreme northern States.

When once established it is very destructive and difficult to get rid of. The only effectual way to combat it is to mow the infested area and burn the cutting. There are two species which are about equally common and destructive to alfalfa and red clover. The seeds of these are of nearly the same size and are not easily distinguished (figs. 6 and 7). The larger dodder seeds approach the smaller alfalfa seeds in size and therefore are difficult to clean out thoroughly. In buying alfalfa seed it is essential to know that it is free from dodder seed.

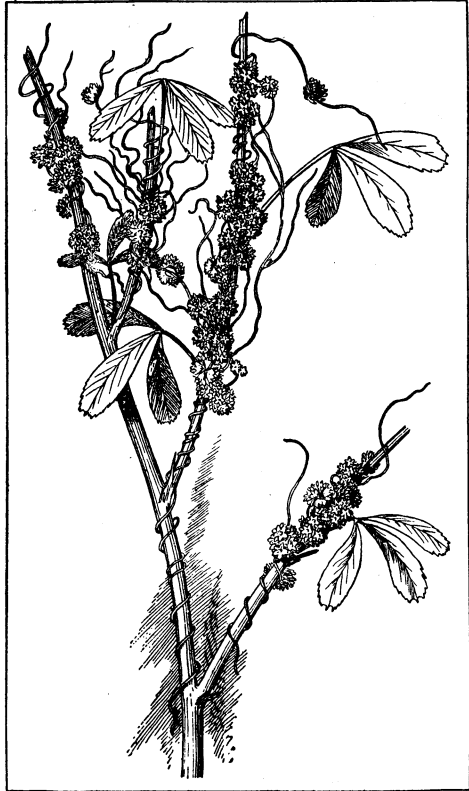


FIG. 5.—Dodder plant on an alfalfa stem.

## PROPORTIONAL COST OF HIGH-GRADE AND LOW-GRADE SEED.

It is usually safe to assume that the highest grade and consequently the highest priced seed offered by any one firm is the cheapest to buy. In the high grades of alfalfa the seed that will grow costs less per

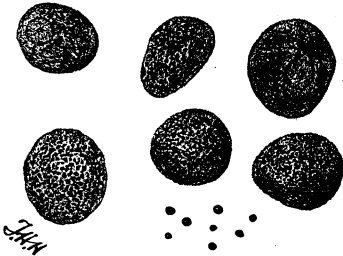


FIG. 6.—Dodder seed (*Cuscuta trifolii*).



FIG. 7.—Dodder seed (*Cuscuta epithymum*).

pound than that in the low grades. When samples from different firms are to be compared a careful estimate of the quality of each should be made and the best quality selected. A good grade of alfalfa should contain not over 2 per cent of impurities, and from 90 to 95 per cent of the seed should grow.

## HOME TESTING.

It is difficult for one who is not accustomed to handling alfalfa seed to accurately determine its percentage of purity, especially the amount of dodder and other weed seeds present, but a general estimate of the quality of unadulterated seed can be formed on the basis of color. The percentage of seed that will grow can easily be determined by means of the simple tester shown in figure 8.

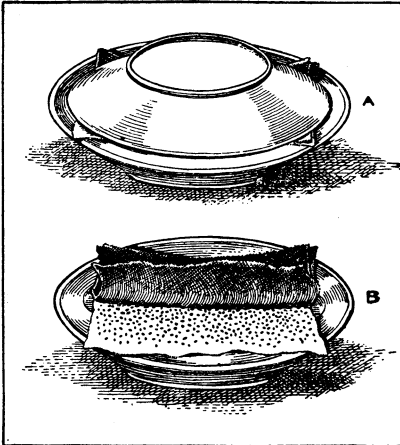


FIG. 8.—Homemade seed tester, A, closed; B, open.

Mix the seed thoroughly and count out 100 or 200 seeds just as they come, making no selection. Put them between a fold of cotton flannel or some similar cloth, taking care not to let the seeds touch one another. Lay the cloth on a plate, moisten it well, but do not saturate it, cover with another

plate and keep at a temperature of about 70° F. Every day count and take out the sprouted seeds. In from four to six days all of the good seeds will have sprouted, and the percentage of seed that will grow is known.

## TESTING BY THE UNITED STATES DEPARTMENT OF AGRICULTURE.

The Seed Laboratory is prepared without charge to make tests of alfalfa seed and of other seeds, both for germination and for mechanical purity. The test for mechanical purity consists in determining the percentage of pure seed and of weed seeds, including dodder. All samples sent for testing should be addressed to the Seed Laboratory, U. S. Department of Agriculture, Washington, D. C., and should be accompanied as far as possible by the following information: Name and address of seller, year and place of growth, price paid, and name and address of sender.

### SUMMARY.

The average quality of alfalfa seed on the market this season is low. A considerable quantity of adulterated and dead seed is being offered for sale.

Do not buy alfalfa seed that is adulterated or that is brown in color.

Do not buy alfalfa seed containing the seeds of dodder.

Get samples and test them, or have them tested, in all cases before buying.

## FARMERS' BULLETINS.

The following is a list of the Farmers' Bulletins available for distribution, showing the number and title of each. Copies will be sent free to any address in the United States on application to a Senator, Representative, or Delegate in Congress, or to the Secretary of Agriculture, Washington, D. C. Numbers omitted have been discontinued, being superseded by later bulletins.

No. 16. Leguminous Plants. No. 22. The Feeding of Farm Animals. No. 24. Hog Cholera and Swine Plague. No. 25. Peanuts: Culture and Uses. No. 27. Flax for Seed and Fiber. No. 28. Weeds: And How to Kill Them. No. 29. Souring and Other Changes in Milk. No. 30. Grape Diseases on the Pacific Coast. No. 31. Alfalfa, or Lucern. No. 32. Silos and Silage. No. 33. Peach Growing for Market. No. 34. Meats: Composition and Cooking. No. 35. Potato Culture. No. 36. Cotton Seed and Its Products. No. 37. Kafir Corn: Culture and Uses. No. 38. Spraying for Fruit Diseases. No. 39. Onion Culture. No. 41. Fowls: Care and Feeding. No. 42. Facts About Milk. No. 43. Sewage Disposal on the Farm. No. 44. Commercial Fertilizers. No. 45. Insects Injurious to Stored Grain. No. 46. Irrigation in Humid Climates. No. 47. Insects Affecting the Cotton Plant. No. 48. The Manuring of Cotton. No. 49. Sheep Feeding. No. 50. Sorghum as a Forage Crop. No. 51. Standard Varieties of Chickens. No. 52. The Sugar Beet. No. 53. How to Grow Mushrooms. No. 54. Some Common Birds. No. 55. The Dairy Herd. No. 56. Experiment Station Work—I. No. 57. Butter Making on the Farm. No. 58. The Soy Bean as a Forage Crop. No. 59. Bee Keeping. No. 60. Methods of Curing Tobacco. No. 61. Asparagus Culture. No. 62. Marketing Farm Produce. No. 63. Care of Milk on the Farm. No. 64. Ducks and Geese. No. 65. Experiment Station Work—II. No. 66. Meadows and Pastures. No. 68. The Black Rot of the Cabbage. No. 69. Experiment Station Work—III. No. 70. Insect Enemies of the Grape. No. 71. Essentials in Beef Production. No. 72. Cattle Ranges of the Southwest. No. 73. Experiment Station Work—IV. No. 74. Milk as Food. No. 75. The Grain Smuts. No. 77. The Liming of Soils. No. 78. Experiment Station Work—V. No. 79. Experiment Station Work—VI. No. 80. The Peach Twig-borer. No. 81. Corn Culture in the South. No. 82. The Culture of Tobacco. No. 83. Tobacco Soils. No. 84. Experiment Station Work—VII. No. 85. Fish as Food. No. 86. Thirty Poisonous Plants. No. 87. Experiment Station Work—VIII. No. 88. Alkali Lands. No. 89. Cowpeas. No. 91. Potato Diseases and Treatment. No. 92. Experiment Station Work—IX. No. 93. Sugar as Food. No. 94. The Vegetable Garden. No. 95. Good Roads for Farmers. No. 96. Raising Sheep for Mutton. No. 97. Experiment Station Work—X. No. 98. Suggestions to Southern Farmers. No. 99. Insect Enemies of Shade Trees. No. 100. Hog Raising in the South. No. 101. Millets. No. 102. Southern Forage Plants. No. 103. Experiment Station Work—XI. No. 104. Notes on Frost. No. 105. Experiment Station Work—XII. No. 106. Breeds of Dairy Cattle. No. 107. Experiment Station Work—XIII. No. 108. Saltbushes. No. 109. Farmers' Reading Courses. No. 110. Rice Culture in the United States. No. 111. Farmers' Interest in Good Seed. No. 112. Bread and Bread Making. No. 113. The Apple and How to Grow It. No. 114. Experiment Station Work—XIV. No. 115. Hop Culture in California. No. 116. Irrigation in Fruit Growing. No. 118. Grape Growing in the South. No. 119. Experiment Station Work—XV. No. 120. Insects Affecting Tobacco. No. 121. Beans, Peas, and Other Legumes as Food. No. 122. Experiment Station Work—XVI. No. 123. Red Clover Seed: Information for Purchasers. No. 124. Experiment Station Work—XVII. No. 125. Protection of Food Products from Injurious Temperatures. No. 126. Practical Suggestions for Farm Buildings. No. 127. Important Insecticides. No. 128. Eggs and Their Uses as Food. No. 129. Sweet Potatoes. No. 131. Household Tests for Detection of Oleomargarine and Renovated Butter. No. 132. Insect Enemies of Growing Wheat. No. 133. Experiment Station Work—XVIII. No. 134. Tree Planting in Rural School Grounds. No. 135. Sorghum Sirup Manufacture. No. 136. Earth Roads. No. 137. The Angora Goat. No. 138. Irrigation in Field and Garden. No. 139. Emmer: A Grain for the Semiarid Regions. No. 140. Pineapple Growing. No. 141. Poultry Raising on the Farm. No. 142. Principles of Nutrition and Nutritive Value of Food. No. 143. The Conformation of Beef and Dairy Cattle. No. 144. Experiment Station Work—XIX. No. 145. Carbon Bisulphid as an Insecticide. No. 146. Insecticides and Fungicides. No. 147. Winter Forage Crops for the South. No. 148. Celery Culture. No. 149. Experiment Station Work—XX. No. 150. Clearing New Land. No. 151. Dairying in the South. No. 152. Scabies in Cattle. No. 153. Orchard Enemies in the Pacific Northwest. No. 154. The Fruit Garden: Preparation and Care. No. 155. How Insects Affect Health in Rural Districts. No. 156. The Home Vineyard. No. 157. The Propagation of Plants. No. 158. How to Build Small Irrigation Ditches. No. 159. Scab in Sheep. No. 161. Practical Suggestions for Fruit Growers. No. 162. Experiment Station Work—XXI. No. 164. Rape as a Forage Crop. No. 165. Culture of the Silkworm. No. 166. Cheese Making on the Farm. No. 167. Cassava. No. 168. Pearl Millet. No. 169. Experiment Station Work—XXII. No. 170. Principles of Horse Feeding. No. 171. The Control of the Codling Moth. No. 172. Scale Insects and Mites on Citrus Trees. No. 173. Primer of Forestry. No. 174. Broom Corn. No. 175. Home Manufacture and Use of Unfermented Grape Juice. No. 176. Cranberry Culture. No. 177. Squab Raising. No. 178. Insects Injurious in Cranberry Culture. No. 179. Horseshoeing. No. 180. Game Laws for 1903. No. 181. Pruning. No. 182. Poultry as Food. No. 183. Meat on the Farm—Butchering, curing, etc. No. 184. Marketing Live Stock. No. 185. Beautifying the Home Grounds. No. 186. Experiment Station Work—XXIII. No. 187. Drainage of Farm Lands. No. 188. Weeds Used in Medicine. No. 189. Information Concerning the Mexican Cotton Boll Weevil. No. 190. Experiment Station Work—XXIV. No. 191. The Cotton Bollworm. No. 192. Barnyard Manure. No. 193. Experiment Station Work—XXV. No. 194. Alfalfa Seed. No. 195. Annual Flowering Plants. No. 196. Usefulness of the American Toad. No. 197. Importation of Game Birds and Eggs for Propagation. No. 198. Strawberries. No. 199. Corn Growing. No. 200. Turkeys. No. 201. Cream Separator on Western Farm. No. 202. Experiment Station Work—XXVI.